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A Framework of using Digital Technology for Empowering People in Thailand's Rural Areas: Case of Nakhon Sawan, Uthai Thani, and Chainat Province

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Abstract
This research aimed 1) to study the framework in using the digital technology for empowering Thai people in rural areas, 2) to survey the information needs in digital media technology, and 3) to propose the prototype for developing the digital technology used. This research used the quantitative method in conducted the research which were divided into 3 steps: 1) surveying the opinion from 10 experts to confirmed the framework, 2) surveying the information need in the digital technology from sampling, and 3) surveying the prototype for developing an application as the digital technology used from sampling. Sampling came from 3 provinces (Nakhon Sawan, Uthai Thani, and Chainat province) by purposive technique. The statistical methods used (mean and standard deviation) are appropriate for the data analysis. The results of each research aims were showed in this paper. The benefits of this study will be used as a guideline for developing the community in the used of digital technology. The limitation also showed as a recommendation to further study.
Keywords: Digital Technology, People in Rural Areas, Thailand

Introduction

Empowering people in rural areas through applications is crucial for bridging the educational and developmental gaps. By utilizing applications like 'Rural Edu Revamp' (Fathima et al., 2024), community-driven geospatial survey platforms, and online stores/websites for community groups (Satyawan, 2016), individuals in rural settings can access quality education materials, gather essential data for informed decision-making, and enhance their entrepreneurial skills. Additionally, incorporating participatory communication strategies in Corporate Social Responsibility programs (Sugito et al., 2022) and supporting empowerment processes in agriculture and natural resource management (Prato & Longo, 2012), are vital for fostering community engagement, knowledge sharing, and sustainable development. These applications not only provide access to resources but also create opportunities for skill development, community participation, and overall empowerment, thereby contributing to the holistic growth and well-being of rural populations.

Implementing Information Technology (IT) initiatives in rural areas faces several key challenges, as highlighted in the research papers. These challenges include the rural digital divide, limited access to reliable internet, outdated infrastructure, high costs of Information Technology resources,

inadequate digital literacy among students and faculty, illiteracy, lack of proper infrastructure, and insufficient professionals in rural areas (Kumari & Srivastava, 2023; Arcuri et al., 2023; Yakasai, 2022; Van Greunen & Fosu, 2022). To address these issues, strategies such as infrastructure improvements, financial assistance, digital literacy programs, customized curricula, sustainable technology adoption, and intervention programs like e-skilling for small-scale farmers have been recommended. These solutions aim to bridge the digital gap, enhance access to relevant educational content, and empower rural communities to effectively harness the benefits of Information Technology in education and various sectors (Kumari & Srivastava, 2023; Van Greunen & Fosu, 2022). The potential of a flexible real-time geospatial survey platform, like the Empower App, in collecting geo-tagged empirical data encompassing infrastructure, socioeconomic, natural resource, and environmental data. Prioritizing informed consent and privacy protection for participants during data collection is crucial, ensuring they are aware of the purpose of data collection and its use. The example of the Nagarcoil Water Survey demonstrates how data related to water availability, quality, and usage patterns can provide valuable insights for water resource management. Future improvements may involve advanced data collection methods, integration with existing datasets, ensuring data integrity, and integration with government portals like Open Government Data and Gati Shakti. Satyawan (2016) focused on the National Program for Community Empowerment in Rural Areas (PNPM-MPd) and its implementation, highlighting the importance of capacity building for both the implementing agency and the target group. It emphasizes the role of information technology, specifically the creation of websites and online stores, in accelerating community empowerment. The study shows that with the support of Information Technology and competent assistants, community empowerment can occur faster. The research conducted in Sumbang and Ajibarang sub-districts demonstrates the positive impact of providing guidance, education, and training to the actors of PNPM-MPd. By enhancing their capacity and facilitating the development of marketing strategies through virtual media, websites, and online stores, the paper contributes to improving the overall performance of the program and empowering the local communities. The research also showed that information technology, such as the introduction of online stores and websites, plays a crucial role in accelerating community empowerment by providing tools for marketing products and services created by community groups, thereby enhancing their economic opportunities and livelihoods.

Through the utilization of information technology, community members, especially those involved in programs like PNPM-MPd, can access resources and assistance to manage their websites and online stores effectively, leading to faster empowerment outcomes. The implementation of information technology enables the target groups to market their products, which not only boosts their economic performance but also contributes to poverty reduction efforts, particularly in rural areas. By integrating information technology into empowerment programs, such as PNPM-MPd, community members can improve their entrepreneurial skills, expand their market reach, and enhance their overall capacity to sustainably run businesses, ultimately leading to a better quality of life and increased self-reliance.

In Thailand, the implementing Information Technology initiatives in rural areas is crucial for enhancing agricultural practices and educational outcomes. The Thai Government has been striving to support smallholder farmers in adopting modern farming methods and digital technologies (Yooyativong & Kamyod, 2023), while also focusing on the evolution of key industries through initiatives like Thailand 4.0 and Industry 5.0 (Chaveesuk et al., 2020). However, there are challenges such as the digital divide and information asymmetry affecting small-scale farmers' agribusiness performance in rural areas (Raungpaka & Savetpanuvong, 2017). Studies have shown the effectiveness of sensor-based Internet of Educational Things (IoET) platforms in improving learning outcomes and engagement in rural schools (Putjorn et al., 2018). Additionally, the implementation of an information technology system allowing farmers to sell products online has shown significant value addition and increased sales in regions like Chiang Mai and Chiang Rai (Bunvorn

& Sopadang, 2017). These initiatives highlight the potential of Information Technology in transforming rural areas in Thailand by empowering farmers and enhancing educational opportunities.

The use of Mobile-based applications also plays a crucial role in enhancing access to agricultural markets for rural farmers in Thailand. By providing real-time monitoring systems for crop conditions, such as soil, solar, and weather data (Praneekit et al., 2023), mobile applications enable farmers to make informed decisions regarding watering, fertilization, and overall crop management, leading to increased productivity and efficiency. Additionally, the use of mobile applications for agricultural extension services (AES) can improve farmers' access to essential digital knowledge and skills, ultimately enhancing their ability to adopt modern farming methods and smart farming equipment (Verma, 2024; Yooyativong & Kamyod, 2023). Furthermore, applications like 'Kueakul' offer features such as land allocation, watering scheduling, and discussion forums, providing farmers with valuable information and resources for better resource management and sufficiency agriculture practices (Komatsu et al., 2021). Overall, mobile-based applications empower rural farmers by equipping them with the necessary tools and knowledge to thrive in the agricultural market.

Methods

This research study has 3 research objectives, researchers was divided into 3 parts which used to meet the research objectives.

Part 1: to study the framework in using the digital technology for empowering Thai people in rural areas: case of Nakhon Sawan, Uthai Thani, and Chainat province.

To study the framework of using digital technology to empower Thais' people in rural areas in this research is divided into 6 steps of research stages as follows:

- Study related articles, documents, and research.
- Draft a preliminary conceptual framework on digital technology used models by draft a preliminary conceptual framework to adapt to people according to the community context by synthesizing the results obtained from studying related documents and research in step 1.
- Determining the expert group. The researcher has determined the relevant experts with the following qualifications: being a teacher in educational technology, computer science or other related fields, holding a master's degree or higher, and having more than 2 years of working experience. The sample selection this time used a purposive sampling method, with 10 people as evaluators of the framework that the researcher has drafted.
- Create a questionnaire to evaluate the appropriateness of the conceptual framework in various aspects of appropriateness in the form of a rating scale to find the appropriateness of the developed framework. The questionnaire will ask about the appropriateness issues according to the framework.
- Collect data from experts. In this step, the researcher used a tool to collect data, which is an online form from Google, by sending the appropriateness assessment form of the developed conceptual framework to 10 experts.
- Improve, edit, and summarize the results. The researcher improved the framework to be suitable for target group according to the community environment as suggested by relevant experts and printed as a conceptual framework.

Part 2: to survey the information needs in digital media technology.

Researchers used questionnaire to surveyed the information needs in digital media technology, details are as follows.

- Selection of sample group by chose from community areas by purposive method which were Chumseang District of Nakhon Sawan province, Lan Sak District of Uthai Thani province, and Hanka District of Chainat province, the sample was 167 people.
- Collection of research data by surveyed with the questionnaire for the information need
- Data analysis by Mean and Standard Deviation (S.D.).

Part 3: to proposed the prototype for developing the web application, researchers search the users' data or collects new data and saves data for testing

the web. Plan the work to limit the scope of the work. Design the database (collect user needs, design the database structure, convert the model from the ER Model to the Relational Model (relational model), design the structure at a lower level). Apply software to design the database (collect and analyze data usage requirements, select a database management system, design the database at the conceptual level, import the database designed at the conceptual level into the database management system, design the database at the physical level, implement the database and evaluate the results). The researcher designs the User Interface (UI) by

- Setting goals, which is an important step in the website development process. If these questions are not clearly answered in the brief, the project may go in the wrong direction.
- Limiting the scope of work is the most common and difficult problem that causes problems in web design projects: the scope of work gradually increases because the client has set goals. But the goals start to expand, develop or change along with the design process. And not only design a website, but also a web application, email and Push Notification.
- a Sitemap and Wireframe as a basis for a well-designed website. It helps web designers to have a clear idea of the information architecture of the site and explain the relationship between the pages and content elements. Building a site without a sitemap is like building a house without a blueprint, and it's hard to do well. The next step is to find design inspiration and create wireframes to store the visual design and content elements of each page and help identify any gaps that may arise from a simple sitemap.
- Creating content. Starting with content, the content engages the reader and pushes them to take the necessary action to achieve the website's goals. This is affected by both the content (writing) and the way it is presented (typography and structure).
- Visual elements play a more important role in web design than ever before. High-quality images not only make a site look professional, they also communicate the mobile-friendly message and help build trust.
- Testing is the act of making sure that all links work and that the site loads properly on all devices and browsers. Errors can result from small coding mistakes, and while it can often be a pain to find and fix, it's better to do it now than to end up with a website that's not working properly.

Web application design is all about finding the right balance between form and function. You need to use the right fonts, colors, and design patterns, but the user experience and approach are just as important. A skilled designer should be well-versed in this concept and be able to create a site that has a smooth content balance between the two. The important thing to remember about the launch process is that the job is never done. The beauty of the site is that you can continue to do user testing of new content and features, review analytics, and refine the message. The site is intended to be a channel for storing student home visit data, using Visual Studio Code, Visual Studio 2019, phpMyAdmin, and includes a ready-made form for recording student home visit data, and the sample was 145 people which used to survey the users' satisfaction by using assessment form with data analysis by Mean and Standard Deviation (S.D.).

Findings

Promotion of the using digital technology for empowering people in Thailand' s rural areas according to the scope of study includes the technological change. The researcher divided into 3 parts as follows:

Part 1: to study the conceptual framework.

The results of the conceptual framework evaluation from 10 relevant experts found that the overall appropriateness of the conceptual framework in all 6 criteria was shown in Table 1.

Table 1 Experts Evaluation the Digital Technology used Framework

Frameworks' Items for Evaluation	Experts' Opinion		
	M	S.D.	Meaning
1. Suitability of conceptual framework components	4.30	0.48	Very Appropriate
2. Suitability of learning content components	4.30	0.67	Very Appropriate
3. Suitability of communication tools components	3.80	0.63	Appropriate
4. Suitability of learner and instructor components	4.00	0.66	Appropriate
5. Suitability of testing and evaluating components	3.80	0.79	Appropriate
6. Appropriateness in the implementation of the conceptual framework	3.80	0.79	Appropriate
Total	**4.00**	**0.67**	**Appropriate**

From Table 1, it shows that digital technology framework was at appropriate level in over all (M = 4.00, S.D. = 0.67), the very appropriate level was Suitability of conceptual framework components (M = 4.3, S.D. = 0.48) and Suitability of learning content components (M = 4.3, S.D. = 0.67) while in Suitability of communication tools components (M = 3.80, S.D. = 0.63), Suitability of learner and instructor components (M = 4.00, S.D. = 0.66), Suitability of testing and evaluating components (M = 3.80, S.D. = 0.79), and Appropriateness in the implementation of the conceptual framework (M = 3.80, S.D. = 0.79) were in appropriate level. This means that the framework in using of digital technology was at appropriate level and can used for research.

Part 2: the survey study of information needs in digital media technology as the communication channel for learning and exchange the experience, news, or knowledge show in Table 2.

Table 2 Results of Survey the Information Needs in Digital Media Technology (N = 167)

Topic	M	SD	Level
The digital media technology should provide information about the community	4.31	0.59	High
The digital media technology should provide information about the community mapping	4.22	0.66	High
The digital media technology should provide information about community's pictures	4.35	0.60	High
The digital media technology should provide information about community product	4.39	0.63	High
The digital media technology should provide information about the sightseeing sites for tourists	4.39	0.63	High
The digital media technology should provide information about the wisdom of communities such as cultures, traditions, beliefs and religions.	4.14	0.71	High
The digital media technology should provide information about the community's natural and environmental information.	4.10	0.69	High
The digital media technology should provide the short learning course	4.19	0.73	High
The digital media technology should provide channel for community of practice and sharing	4.25	0.69	High
The digital media technology should provide a community development plan	4.23	0.65	High
The digital media technology should provide community activity	4.48	0.59	High
Total	4.27	0.65	High

From Table 2, the results of survey the information needs in digital media technology in overall was at High level (M= 4.27, S.D. = 0.65). The results showed that the digital media technology should provide community activity (M = 4.48, S.D. = 0.59) was at highest Mean score followed by the digital media technology should provide information about community product (M = 4.39, S.D. = 0.63), the digital media technology should provide information about the sightseeing sites for tourists (M = 4.39, S.D. = 0.63), the digital media technology should provide information about community' s pictures (M = 4.35, S.D. = 0.60), the digital media technology should provide information about the community (M = 4.31, S.D. = 0.59), the digital media technology should provide channel for community of practice

and sharing (M = 4.25, S.D. = 0.69), the digital media technology should provide a community development plan (M = 4.23, S.D. = 0.65), the digital media technology should provide information about the community mapping (M = 4.22, S.D. = 0.66), the digital media technology should provide the short learning course (M = 4.19, S.D. = 0.73), the digital media technology should provide information about the wisdom of communities such as cultures, traditions, beliefs and religions (M = 4.14, S.D. = 0.71), and the digital media technology should provide information about the community' s natural and environmental information (M = 4.10, S.D. = 0.69) respectively.

Part 3: The result of proposed the prototype for developing the web application

Table 3 Results of the Web Application Prototype Components (N = 145)

No.	Topic	M	S.D.	Level
	1. Application content			
1.1	Content accuracy	4.41	0.49	High
1.2	Content completeness	4.39	0.49	High
1.3	Content consistency	4.45	0.50	High
1.4	Content appropriateness	4.51	0.50	Very High
1.5	Content appropriateness to user level	4.50	050	High
1.6	Information is useful and meets the needs of use	4.37	0.49	High
	The overall of application content	4.44	0.49	High
	2. Content Presentation			
2.1	Appropriateness of the presentation	4.33	0.47	High
2.2	Clarity of the presentation	4.42	0.51	High
2.3	Interestingness of the presentation	4.43	0.49	High
2.4	Content consistency of the presented images	4.39	0.49	High
2.5	Overall color of the font	4.57	0.49	Very High
2.6	Font size used in the presentation	4.06	0,54	High
	The overall of presentation of the application content	4.37	0.50	High
	3. Web Application Management			
3.1	Ease of use of the system	4.06	0.59	High
3.2	Stable, can be accessed continuously	4.04	0.53	High
3.3	Fast display of images, text and data	4.08	0.56	High
3.4	Data presentation techniques	4.13	0.57	High
3.5	Data display order	4.17	0.54	High
	The overall of application management	4.10	0.56	High
	Total	**4.30**	**0.52**	**High**

From Table 3, the overall results of proposed the prototype for developing the web application was at High level (M= 4.30, S.D. = 0.52). Focusing in each component, it showed that the overall of application content was at High level (M = 4.44. S.D. = 0.49) and the Content was appropriateness at Very High level (M = 4.51, S.D. = 0.50). The overall of presentation of the application content was at High level (M = 4.37, S.D. = 0.50) and the overall color of the font was at Very High level (M = 4.57, S.D. = 0.49). The overall of application management was at High level (M = 4.10, S.D. = 0.56). The concluded that the overall of satisfaction toward in each question in all components was at a high level.

Discussions and Conclusions

The results from this study may discuss in term the used of digital technology may benefit

to people in rural areas. This same as the result of many researchers also concluded that digital technology plays a crucial role in empowering rural areas in Thailand by enhancing agricultural practices and community development. Research in Thailand highlights the importance of digital tools in improving agricultural GDP and small holder farmers' economic situations (Yooyativong & Kamyod, 2023). Additionally, studies emphasize the significance of integrating innovative communication and digital media into Open and Distance Learning (ODL) to empower the farm sector at all levels (Intaratat, 2022). Furthermore, the use of digital media impacts daily communication and influences the well-being of rural populations, emphasizing the need for careful consideration and investment in modern media tools while addressing unintended consequences (Jongsuksomsakul, 2018). By leveraging digital technologies, such as digital mapping for land use planning and smart farming equipment, rural communities in Thailand can enhance productivity, sustainability, and overall quality of life, ultimately contributing to rural area development and empowerment (Ratnasari, et al, 2024).

The results related to the demonstrated how integrating cutting-edge communication and digital media into Open and Distance Learning (ODL) can empower Thailand's farm industry at all levels of Intaratats' work where eight important farm leaders from four successful farms participated in case-based studies using qualitative research methods like data mapping and interview forms, leading to tangible results on the empowerment of farm sectors through ODL integrated with innovative communication and digital media. Key discoveries from the study include the essential factors that ODL integrated with innovative communication and digital media must consider to empower all levels of farm sectors effectively such as 1) undertaking initiatives for the right reasons, such as addressing disruptions in the industry, 2) being sensitive to the real demands, problems, and phenomena faced by farmers, 3) ensuring alignment with the existing context, including disruptive infrastructure like farms and information and communication technology (ICT), 4) engaging all stakeholders through participatory processes to maximize effectiveness, 5) designing innovative communication tools that are appropriate and tailored to fit the diverse contexts of farmers, including aspects like friendly relationships, pedagogy, administration, and various participatory channels both online and offline. The results highlight the importance of a holistic approach that considers the unique needs and challenges of farmers at different levels within the industry, emphasizing the significance of tailored solutions and stakeholder engagement for successful empowerment. Overall, the study's results showcase the potential of ODL integrated with innovative communication and digital media to drive positive change and empowerment across all levels of the farm sectors, contributing to the Sustainable Development Goals (SDGs) in Thailand (Intaratat, 2022). Moreover, Yooyativong & Kamyod (2023) claimed that the implementation of the Digital Farmer Development Framework has demonstrated significant improvements in farmers' capabilities to use digital technology for farm management and productivity. According to Bloom's taxonomy guidelines, all farms in the project were able to apply digital skills, utilize fundamental smart farming equipment, and evaluate and analyze data from IoT devices. The success of the Digital Farmer Development Framework highlights the importance of providing comprehensive support, including knowledge, training, and resources, to facilitate the digital upskilling of small holder farmers. By addressing the barriers related to digital knowledge gaps and limited access to investment support for smart farming equipment, the framework has paved the way for improved agricultural productivity and economic outcomes for small holder farmers in Thailand's rural areas.

The results of this research also showed that people in rural areas needs the community information to show the status and current event in their community, the knowledge sharing or learning in community should addressed in the web application so this related to research in term of training community members to knowhow to use the technology by Medvedev & Molodyakov (2019), who claimed that regional adaptation and government support are crucial for the widespread implementation of these IoT courses. It is essential to analyze the quality of the courses

through feedback from both trainers and trainees to identify shortcomings, failures, and successes for future improvements. The relationship between software developers and farmers is highlighted, emphasizing the need for a common understanding in smart farming and software development. The target audience for training includes software developers and advanced end-users, requiring a curriculum that covers smart farming basics and software development technologies for IT specialists. The curriculum development methodology is based on analyzing IoT business models and specialist models. Business models help define the relationships among various IoT ecosystem players, while specialist models outline the necessary competencies for successful implementation of duties in the field. This approach ensures that the courses are tailored to meet the specific needs of the target audience. Moreover, it is suggested that communities can effectively understand and apply digital mapping technologies with the support of facilitators. This indicates the potential for empowering communities to actively participate in spatial planning processes and participatory mapping can lead to the generation of tailored recommendations for land use planning in villages. This underscores the significance of involving local communities in decision-making processes to ensure development plans align with their specific needs (Ratnasari, et al, 2024). However, in this research has limitation in collected the sample group where one district was closed in each province which researchers chose by purposive due to the areas limited so in the further research should explore more district in each province.

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